



# Practicum in Reproducible Research Methods

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To register: [https://www.eui.eu/DepartmentsAndCentres/academic-catalogue/Course-detail?course\\_id=SPS-RESGO-REP-20](https://www.eui.eu/DepartmentsAndCentres/academic-catalogue/Course-detail?course_id=SPS-RESGO-REP-20)

Second term seminar 2020–21  
Tuesday 15:00-17:00, via Zoom

Course site: <https://mycourses.eui.eu/d2l/home/7435>

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**Course Description:** This course walks you through all the steps involved in a complex collaborative reproducible research project, from thinking up a problem worth studying to pre-registering your design to collecting and analyzing your data and writing up and posting your results. You will practice these steps using real data collected by the instructor. To master the skills involved, you will work in teams and hand in bi-weekly homework assignments.

**Course Prerequisites:** You will only be able to do the work in this course if you are familiar with statistical methods to analyze quantitative data. Thus, students are welcome in the course if they have taken at least one prior course in statistics (covering material through multiple regression) that used either Stata or R. All other skills required this term will be taught by the instructor.

**Course Objectives:** At the completion of this course, you will:

1. Have experience working with a complex multilevel dataset.
2. Have practiced many activities required to complete a large-scale reproducible research project.

carve out Pakistan dataset; post both datasets on Brightspace; edit references to Schimel to go to electronic edition

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3. Have experience collaborating with others in a research project.
  4. Have developed familiarity with tools such as L<sup>A</sup>T<sub>E</sub>X, RMarkdown, and GitHub, and be acquainted with sites such as BITSS, OSF, EGAP, Dataverse, and others.
  5. Have improved research practices and skills.
  6. Be familiar with the highest standards and practices for many aspects of reproducible research.
  7. Have gained an overview of the entire research process that will give you a more realistic and complete idea of the timeframe, intellectual commitment, and skills involved in real research.

**Course Format:** This course is hands on and requires active engagement with data, the internet, and various applications during class time. Please make sure your setup is appropriate. You will need a stable and robust internet connection to do the work during class meetings. Class sessions will ask you to work on your laptop and potentially to access the internet while also retaining a stable Zoom connection to the group.

**Readings:** The readings are typically short and skills-oriented. Thus, they require a very specific kind of reading. You should first skim an assigned reading for the skills it covers and then carefully study the sections that are relevant to what you want to accomplish. At that point, you should **implement the techniques** that the reading discusses. If you are reading about how to structure your directories for a research project, take a look at your own directory structure for your most active research project and consider how the reading would suggest you modify it. Then go ahead and restructure your directories for that project. The only way to learn the skills that the practicum readings cover is to implement them, thereby developing “muscle memory.” Over the course of the term, incorporate as many of the skills we study into your own workflow as possible. Your goal is to make them part of your standard research routines.

Note that most entries on this syllabus are hyperlinked to the publication site.

We read almost all of two books this term, which you may wish to purchase:

[Gandrud, C. \(2020\). \*Reproducible Research with R and RStudio\*. CRC Press, Boca Raton, FL, 3rd edition.](#)

[Christensen, G., Freese, J., and Miguel, E. \(2019\). \*Transparent and Reproducible Social Science Research: How To Do Open Science\*. University of California Press, Oakland.](#)

Note that I will be teaching from the 3<sup>rd</sup> edition of the Gandrud book. It contains extensive new material on integrating RMarkdown into your workflow that is not available in the 2<sup>nd</sup> edition.

We will also read much of Schimel, J. (2012). *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Oxford University Press, Oxford. (Readings

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from this book will be incorporated into the syllabus when library access is available.) The library has purchased access to the electronic version but only three readers can access it simultaneously. For this reason, you may wish to rent the book for the term or purchase personal access.

Finally, readings are front-loaded in the term. The first four weeks feature a lot of assigned reading. The quantity drops off very considerably after that. Your goal is to use the first month of the course to study and start to implement the new research skills we focus on. In the remaining six weeks, your goal is to extend the activities where you apply them and to make them routine parts of your work.

**Data:** You may select to work with one of two datasets this term:

- A dataset of all Italian legislators who served in the X and XI and the XV and XVI Legislatures, which includes information on charges of criminal activity and corruption, press coverage of the individual, and standard demographic and political characteristics. This study uses observational data.
- A dataset containing information on how a random sample of 14,400 respondents in 20 electoral constituencies in one Pakistani province reacted in 2018 after receiving questions delivered by Interactive Voice Response technology from 20 randomly chosen Members of the Legislative Assembly (MPAs) from all political parties. The data in this study was generated experimentally.

Both datasets are available on Brightspace.

Your team will work with the same dataset all term.

**Software(s):** You may use either Stata or RStudio to do the statistical work for the course. For all assignments, you will write in RMarkdown. I will demonstrate how to integrate either R or Stata into a Markdown document. You will produce graphics using ggplot2.

You are expected to present descriptive statistics and regression results in your work. You are discouraged from using more advanced statistical techniques in this course. This is a course in which you build research — not statistical — skills. All work must be accurate, complete, and thoughtful.

**Homework Assignments:** All homework should be submitted in .pdf format unless otherwise specified. Some assignments require you integrate your statistical code into your Markdown document. Code must be a clean run and must be properly annotated. Your code may be written in Stata or in R. **If your code does not run, your assignment will be considered incomplete and you may not receive credit for it.** Please make sure to write relative directory paths so that your code will run on my

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computer with a single line change in the first section of the file indicating the name and location of the working directory.

**Course Website:** We will use the Brightspace Learning course site. Any materials not already in the public domain will be posted in Brightspace. You will also submit your homework assignments there. The site is also useful for conversations with other students, as well as to ask questions of me.

**Collaboration:** Students will work in teams for the term. Teams will be set up during the first class meeting. Team size will depend on the number of students enrolled, but you will probably be paired with one or two others. You will remain with the same team-mate(s) for the entire term. All homework assignments will be jointly submitted and jointly graded.

**Requirement(s):** To complete the course for a grade, each team will submit an assignment every other week. The assignments will be available on the Brightspace course site. They will be blind-graded.

### **Course Policies:**

- Students should come to class meetings each week **already having read** the assigned material.
- Students should come to class meetings each week **already having practiced** whatever specific skills are assigned that week. That way, you will be well positioned to bring questions and problems to the attention of the instructor.
- Because you cannot learn skills without practicing them, this course is not open to auditors.
- All students are expected to be active class participants.
- Materials are to be submitted on time to be given full credit. Please ensure that the timestamp for every submission is within ten minutes of the time due.

### **Other Resources:**

In addition to readings and sites listed on the syllabus, you will find it useful to familiarize yourself with the following sites and resources:

[Empirical Studies of Conflict \(ESOC\)](#) resource links

[Berkeley Initiative for Transparency in the Social Sciences \(BITSS\)](#) resource library

[World Bank Reproducibility Training](#)

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[NBER Summer Institute 2019 Methods Lecture: Research Transparency and Reproducibility](#)

[2019 EASST/BITSS Transparency Training Workshop](#)

[Open Science Framework \(OSF\) Guides for Best Practices](#)

[Declare Design](#)

[Harvard Dataverse \(data repository\)](#)

[ICPSR \(data repository\)](#)

[Evidence in Governance and Politics \(EGAP\) Methods Guides](#)

[Evidence in Governance and Politics \(EGAP\) Policy Briefs](#)

[Center for Effective Global Action\(CEGA\) Policy Briefs](#)

[International Growth Centre\(IGC\) Impact Case Studies](#)

[CITI Program for Social-Behavioral-Education \(SBE\) Basic training in the protection of human subjects](#)

[Social Science Prediction Platform](#)

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## SYLLABUS

### Week One, January 12: Getting started with reproducible research

- Overview: why reproducible research matters
- Exploring your dataset
- Picking a research question
- Forming a research team
- Setting up SOP and lab arrangements
- Writing your team MOU
- Working in RMarkdown

Gandrud, C. (2020). *Reproducible Research with R and RStudio*. CRC Press, Boca Raton, FL, 3rd edition, chs. 1–3 and 12.

Christensen, G., Freese, J., and Miguel, E. (2019). *Transparent and Reproducible Social Science Research: How To Do Open Science*. University of California Press, Oakland, ch. 11.

Lin, W., Green, D., and Coppock, A. (2016). Standard operating procedures for Don Green's lab at Columbia.

Shapiro, J. N. (2019). ESOC research production guide, v1.0.

Golden, M. A. (2020). Recommended guidelines for authorship, awarding credit, and intellectual property rights.

#### Datasets

Read the article that is relevant for the dataset your team will work with all term:

Asquer, R., Golden, M. A., and Hamel, B. T. (2020). Corruption, party leaders, and candidate selection: Evidence from Italy. *Legislative Studies Quarterly*, 45(2):291–325

or

Golden, M., Gulzar, S., and Sonnet, L. (2020). 'Press 1 for Roads': Constituency service with new communication technology.

*First homework assignment available. It will require each team to use RMarkdown to write a collaborative agreement, set up a GitHub repo, and provide an initial structure for project directories.*

### Week Two, January 19: Establishing your workflow

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- Overview of reproducible workflow
  - Setting up your project on GitHub
  - Organizing your repo
  - Using readme documents
  - Commenting your code

Gandrud, C. (2020). *Reproducible Research with R and RStudio*. CRC Press, Boca Raton, FL, 3rd edition, ch. 4.

Nagler, J. (1995). Coding style and good computing practices. *PS: Political Science & Politics*, 28(3):488–92.

Wilson, G., Aruliah, D., Brown, C. T., Hong, N. P. C., Davis, M., Guy, R. T., Haddock, S. H., Huff, K. D., Mitchell, I. M., Plumbley, M. D., Waugh, B., White, E. P., and Willson, P. (2014). Best practices for scientific computing. *PLoS Biology*, 12(1):1001745.

Wilson, G., Bryan, J., Cranston, K., Kitzes, J., Nederbragt, L., and Teal, T. K. (2017). Good enough practices in scientific computing. *Plos Computational Biology*.

Bowers, J. and Voors, M. (2016). How to improve your relationship with your future self. *Revista De Ciencia Política*, 36(3):829–48

and/or

Evidence in Governance and Politics (EGAP). 10 things to know about project workflow.

Familiarize yourself with:

Open Science Framework (OFS). OSF Guides (Best Practices), especially the sections on File naming and Organizing files.

*First homework assignment due*

### **Week Three, January 26: Planning your study**

- Designing your (pilot) study
- Securing funding
- Setting up a project pipeline
- Thinking through your research design
- Establishing a partnership in the field

Gandrud, C. (2020). *Reproducible Research with R and RStudio*. CRC Press, Boca Raton, FL, 3rd edition, ch. 5.

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Przeworski, A. and Soloman, F. (1995; rev. 1988). On the art of writing proposals.

Sohn, E. (2020). Secrets to writing a winning grant. *Nature*, 555:133–35.

Familiarize yourself with:

Blair, G., Cooper, J. J., Coppock, A., and Humphreys, M. (2019). Declaring and diagnosing research designs. *American Political Science Review*, 113(3):838–59.

and

[Declare Design](#) website

### **Week Four, February 2: Pre-analysis plans, data management plans, and pre-registration**

- Writing your pre-analysis plan
- Writing your DMP
- Registering your pre-analysis plan at EGAP

*Note:* The first hour of class will be conducted by Simone Sacchi and Thom Bourke of the EUI Library.

Christensen, G., Freese, J., and Miguel, E. (2019). *Transparent and Reproducible Social Science Research: How To Do Open Science*. University of California Press, Oakland, chs. 3–6.

Humphreys, M., Sanchez de la Sierra, R., and van der Windt, P. (2013). Fishing, commitment, and communication: A proposal for comprehensive nonbinding research registration. *Political Analysis*, 21(1):1–20.

Editors (2019). What science looks like. *Nature Human Behavior*, 3:763.

Evidence in Governance and Politics (EGAP). 10 things to know about pre-analysis plans.

McKenzie, D. (2012). A pre-analysis plan checklist. World Bank Blogs.

Oforu, G. and Posner, D. N. (2019). Pre-analysis plans: A stocktaking. Unpublished paper.

EUI Library (2020). Research data guide. 8th ed.

Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.-W., da Silva Santos, L. B., Bourne, P. E., Bouwman, J.,



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Brookes, A. J., Clark, T., Crosas, M., Dillo, I., Dumon, O., Edmunds, S., Evelo, C. T., Finkers, R., Gonzalez-Beltran, A., Gray, A. J. G., Groth, P., Goble, C., Grethe, J. S., Heringa, J., 't Hoen, P. A. C., Hooft, R., Kuhn, T., Kok, R., Kok, J., Lusher, S. J., Martone, M. E., Mons, A., Packer, A. L., Persson, B., Rocca-Serra, P., Roos, M., van Schaik, R., Sansone, S.-A., Schultes, E., Sengstag, T., Slater, T., Strawn, G., Swertz, M. A., Thompson, M., van der Lei, J., van Mulligen, E., Velterop, J., Waagmeester, A., Wittenburg, P., Wolstencroft, K., Zhao, J., and Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data*, 3(1):160018.

Van den Akker, O. R., Weston, S. J., Campbell, L., Chopik, W. J., Damian, R. I., Davis-Kean, P. E., Hall, A. N., Kosie, J. E., Kruse, E., Olsen, J., Ritchie, S. J., Valentine, K., van 't Veer, A. E., and Bakker, M. (2020). Preregistration of secondary data analysis: A template and tutorial.

Review carefully:

[EUI Research Data Services](#), especially 3. Data Management Plans.

*Second homework assignment available. It will require each team to examine the dataset provided by the instructor and write a PAP designed to answer a specified research question. Your PAP must include a Data Management Plan, which you will prepare via DMPonline. You will also pre-register your PAP with EGAP.*

### **Week Five, February 9: Research ethics and human subjects protection**

- Ethical obligations to subjects
- Ethical obligations to staff
- Obtaining approval from the Ethics Committee or IRB
- CITI certification
- Informed consent

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1978). *The Belmont Report. Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. U.S. Government Printing Office, Washington, D.C.

Christensen, G., Freese, J., and Miguel, E. (2019). *Transparent and Reproducible Social Science Research: How To Do Open Science*. University of California Press, Oakland, ch. 2.

APSA Ad-Hoc Committee on Human Subjects Research (2019). Report of the APSA ad-hoc committee on human subjects research.

World Health Organization, Research Ethics Review Committee. Informed consent tem-

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plate for qualitative studies. Geneva.

Familiarize yourself with:

[CITI Program for Social-Behavioral-Education \(SBE\)](#) Basic training in the protection of human subjects

*Second homework assignment due.*

### **Week Six, February 16: Forecasting results**

- Forecasting your results
- Programming your forecasting instrument on Qualtrics
- Using the Social Science Prediction Platform for forecasting

[DellaVigna, S. and Pope, D. \(2018\). Predicting experimental results: Who knows what? \*Journal of Political Economy\*, 126\(6\):2410–56.](#)

[Della Vigna, S., Otis, N., and Vivaldi, E. \(2020\). Forecasting the results of experiments: Piloting an elicitation strategy. \*AEA Papers and Proceedings\*, 110:75–79.](#)

[Schimel, J. \(2012\). \*Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded\*. Oxford University Press, Oxford, chs. 16 and 20.](#)

Sign up for an account and make a prediction on:

[Social Science Prediction Platform.](#)

### **Week Seven, February 23: Field work and data collection**

- Staying safe in the field
- Managing staff and enumerators
- Collecting your data
- Storing and organizing your data
- Assembling an operational dataset

[Gandrud, C. \(2020\). \*Reproducible Research with R and RStudio\*. CRC Press, Boca Raton, FL, 3rd edition, chs. 6–7.](#)

[Gentzow, M. and Shapiro, J. M. \(2014\). Code and data for the social sciences: A practitioner's guide.](#)

[European University Institute \(2017\). EUI policy on risk missions.](#)

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*Third homework assignment available. This will require each team program a forecasting exercise about your study in Qualtrics and write a complete request to the Ethics Committee to obtain approval to administer the forecasting exercise.*

### **Week Eight, March 2: Reporting preliminary results**

- Analyzing your data
- Writing internal reports
- Using graphics effectively

Gandrud, C. (2020). *Reproducible Research with R and RStudio*. CRC Press, Boca Raton, FL, 3rd edition, chs. 9–11.

Schwabish, J. (2014). An economist's guide to visualizing data. *Journal of Economic Perspectives*.

Rudis, B., Ross, N., and Garnier, S. The viridis color palette.

Schimel, J. (2012). *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Oxford University Press, Oxford, chs. 4–10.

*Third homework assignment due*

### **Weeks Nine, March 9: Writing up final results**

- Writing up results
- Writing an effective abstract
- Adhering to scientific reporting standards

Christensen, G., Freese, J., and Miguel, E. (2019). *Transparent and Reproducible Social Science Research: How To Do Open Science*. University of California Press, Oakland, chs. 8–9.

Aczel, B. e. (2019). A consensus-based transparency checklist. *Nature Human Behavior*, Published online 2 Dec 2019.

Schimel, J. (2012). *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Oxford University Press, Oxford, chs. 11-15.

### **Weeks Ten, March 16: Publishing, publicizing, and documenting your work**

- Writing your policy brief

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- Preparing replication code
  - Preparing a publicly accessible dataset
  - Preparing a codebook

Christensen, G., Freese, J., and Miguel, E. (2019). *Transparent and Reproducible Social Science Research: How To Do Open Science*. University of California Press, Oakland, ch. 10.

Kopper, S., Sautmann, A., and Turitto, J. (2020). J-PAL guide to publishing research data.

National Academies of Sciences, Engineering, and Medicine (2017). *Communicating Science Effectively: A Research Agenda*. The National Academies Press, Washington, D.C, chs. 1–2 and 5.

Lupia, A. (2019). Communicating science in politicized environments. *Proceedings of the National Academy of Sciences*, 110(Supplement 3):14048–54.

Schimmel, J. (2012). *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Oxford University Press, Oxford, chs. 18–19.

Read at least five policy briefs from [Evidence in Governance and Politics \(EGAP\) Policy Briefs](#) and/or [Center for Effective Global Action\(CEGA\) Policy Briefs](#)

*Fourth homework assignment available. This will require each team to write up final results in a professional format, prepare your replication code, prepare a codebook, and write a policy brief to publicize your results to a lay audience. The assignment is due at 15:00 on March 23.*